

# **Superfund and Mining Megasites - Lessons from the Coeur d'Alene River Basin**

David J Tollerud, MD, MPH

Professor and Chair  
Department of Environmental & Occupational Health Sciences  
School of Public Health & Information Sciences  
University of Louisville

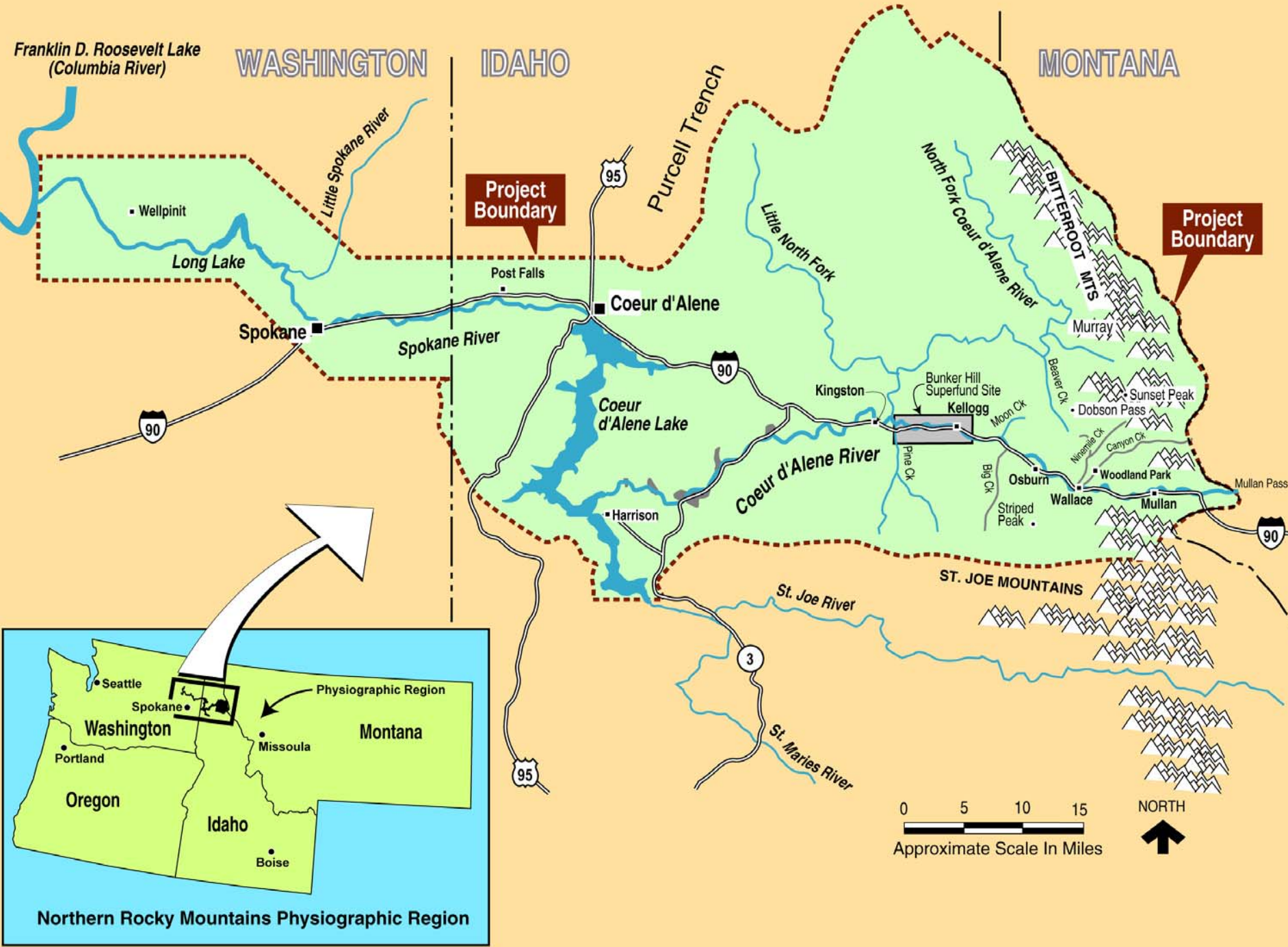
Chair, Committee on Superfund Site Assessment and Remediation in  
the Coeur d'Alene River Basin

National Research Council  
Board on Environmental Studies and Toxicology  
National Academies of Science

# The Coeur d'Alene River Basin

# The Coeur d'Alene River Basin

- Coeur d'Alene River System 70 miles long
- Flows into 25 Mile long Coeur d'Alene Lake
- From there Flows into the Spokane River - Source of Water for Spokane Washington
- Home to the Coeur d'Alene and Spokane Tribes
- Long History of Mining





















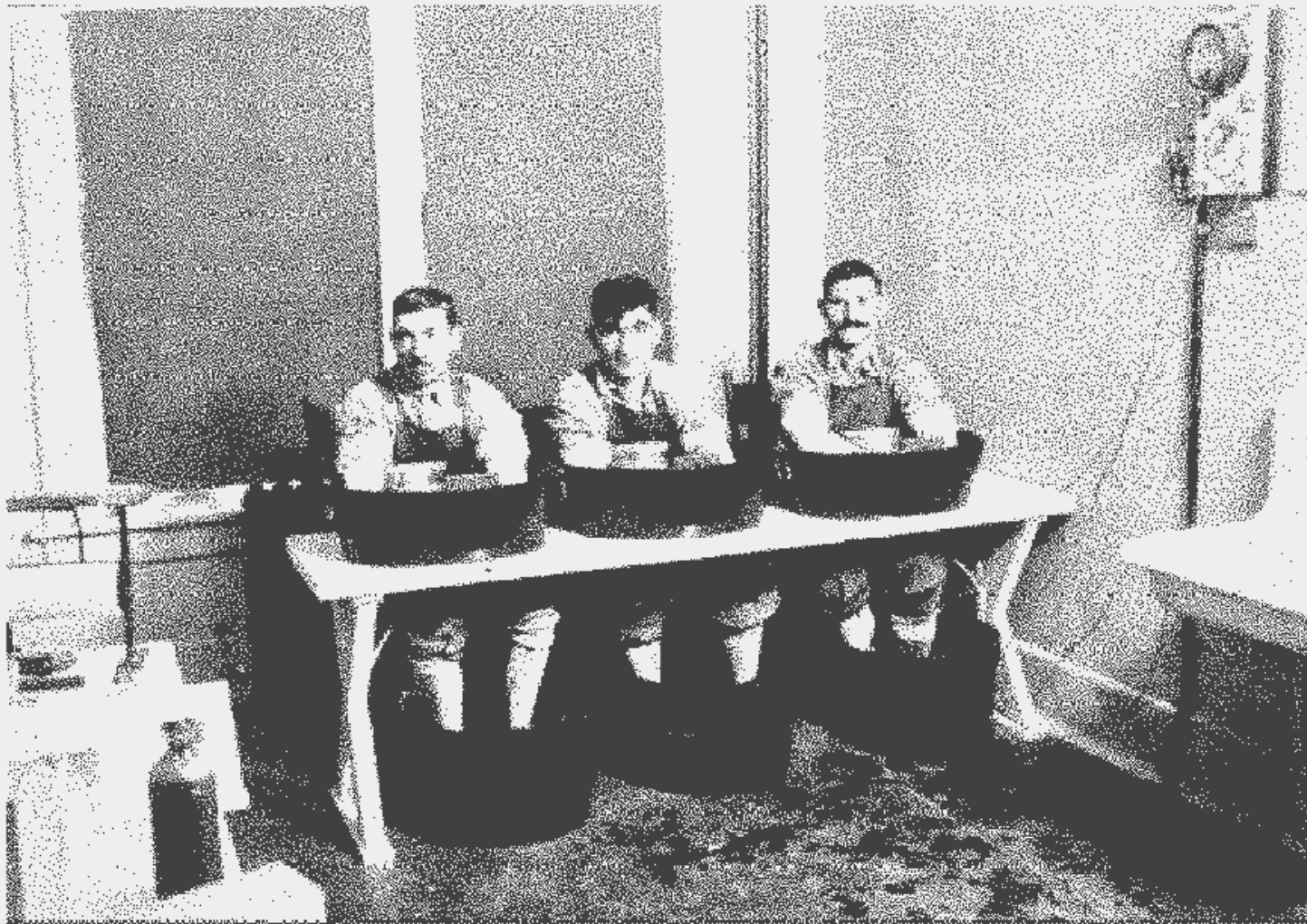
# Mining in the “Silver Valley”

- “Gold Rush” in 1880’s (Brief)
- The “Real” Riches: Silver, Lead and Zinc
- Over a century, 140 Million Tons of Ore
- 20% of US Silver, Lead and Zinc Production
- Massive Pollution of the River Basin and Lake with Mine Tailings
- Health Effects for Miners was Known



**FIGURE 2-5** Tailings Dam at Osburn, Idaho, 1920. Source: Bennett 1994. Permission Pending.





**FIGURE 2-6** Workers taking the Clague electrolytic treatment. Source: Bennett 1994, Permission Pending.

# Bunker Hill Mine and Smelting Complex

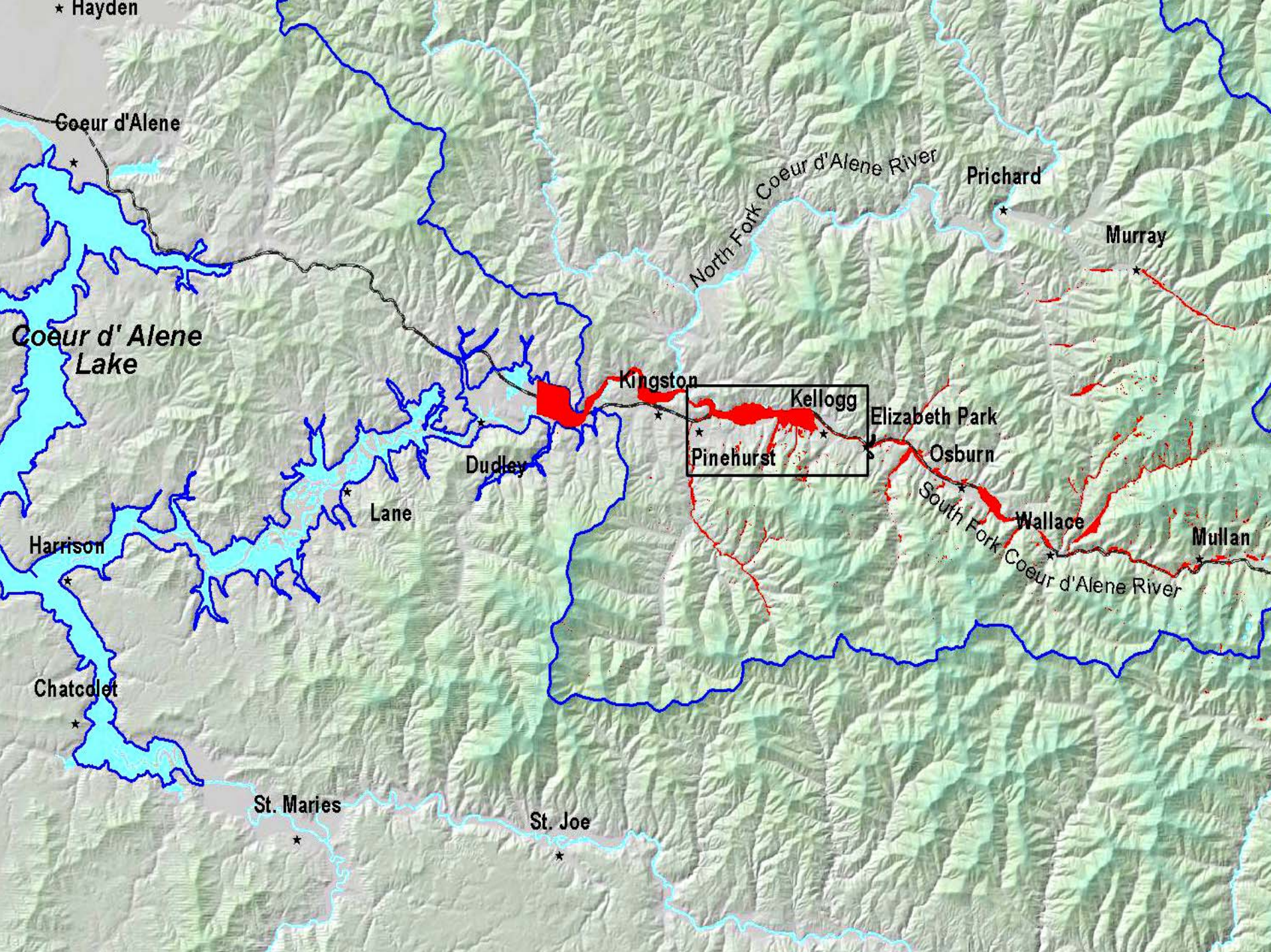
- Largest Mine in the Valley
- Smelter Served over 100 Mines
- Largest Smelter in the World
- Produced High-Purity Silver, Zinc and Lead
- 1973 -- Pollution Control Equipment Damaged
  - Owners Secretly Elected NOT to Repair
  - Emitted 160 tons/month particulates (50-70% Lead)
  - Large Areas of the Basin Contaminated with Lead
  - Air Concentrations up to 30mcg/cu meter



# Human Health Concerns

- 1976 Study: 99% of Children had Blood Lead >40 mcg/dL, including 40% of Children aged 1-9
- Bunker Hill Complex Spent \$21M to Decrease Air and Water Pollution
- Metal Prices Dropped, Plant Closed in 1981
  - Loss of 2,100 Jobs (75% of Region's Workforce)
- 1983 "Bunker Hill Box" named NPL site for "Fast-track Clean-up)
  - 3 Miles Wide and 7 Miles Long
  - Remediation Began in 1986







# Contamination Outside the “Box”

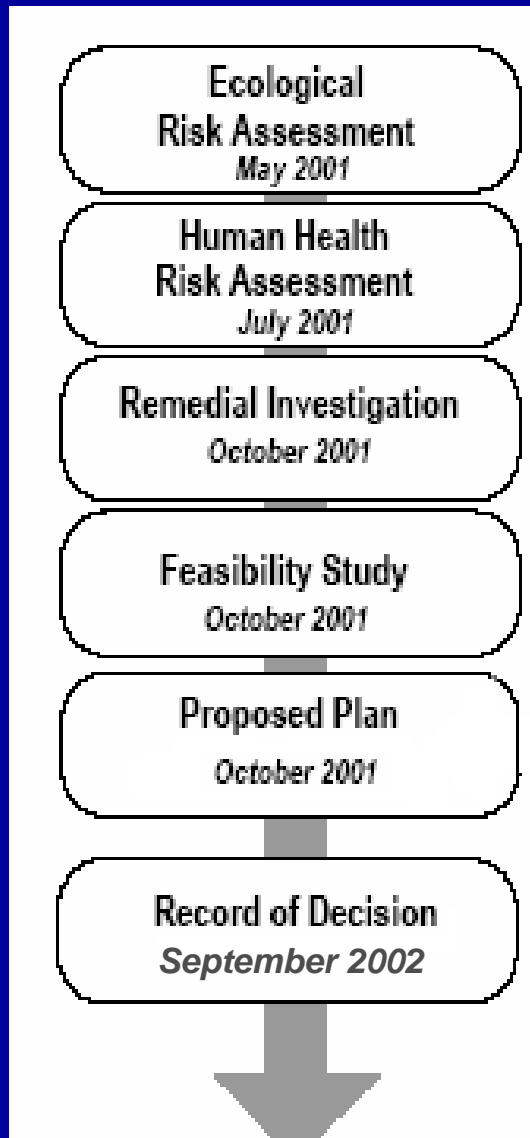
- EPA Tried non-Superfund Mechanisms
- Multiple Law Suites Brought Against Mines, State, Feds
- 1998 EPA Designated 1,500 Square Mile Area as NPL Site: Stretching from Montana through Idaho to Spoke, WA
- Storm of Controversy
  - “Leave it Alone”
  - “Clean up to Historical Background”
  - “Protect Human Health, then STOP”
- NAS Asked to Evaluate

# EPA's Responsibilities Under CERCLA

- Site Characterization
- Risk Assessment
  - Human Health
  - Ecological Health
- Clean-up Goals and Approaches (Remedial Investigation)
- “Selected Remedy”



# Superfund Process



# Statement of Task

- Directs the committee to examine the scientific and technical practices in EPA's decision making.
- Roughly parallels the Superfund Process.
- Directs the committee to develop lessons learned from the Coeur d'Alene River Basin and approaches for dealing with large complex Superfund sites.

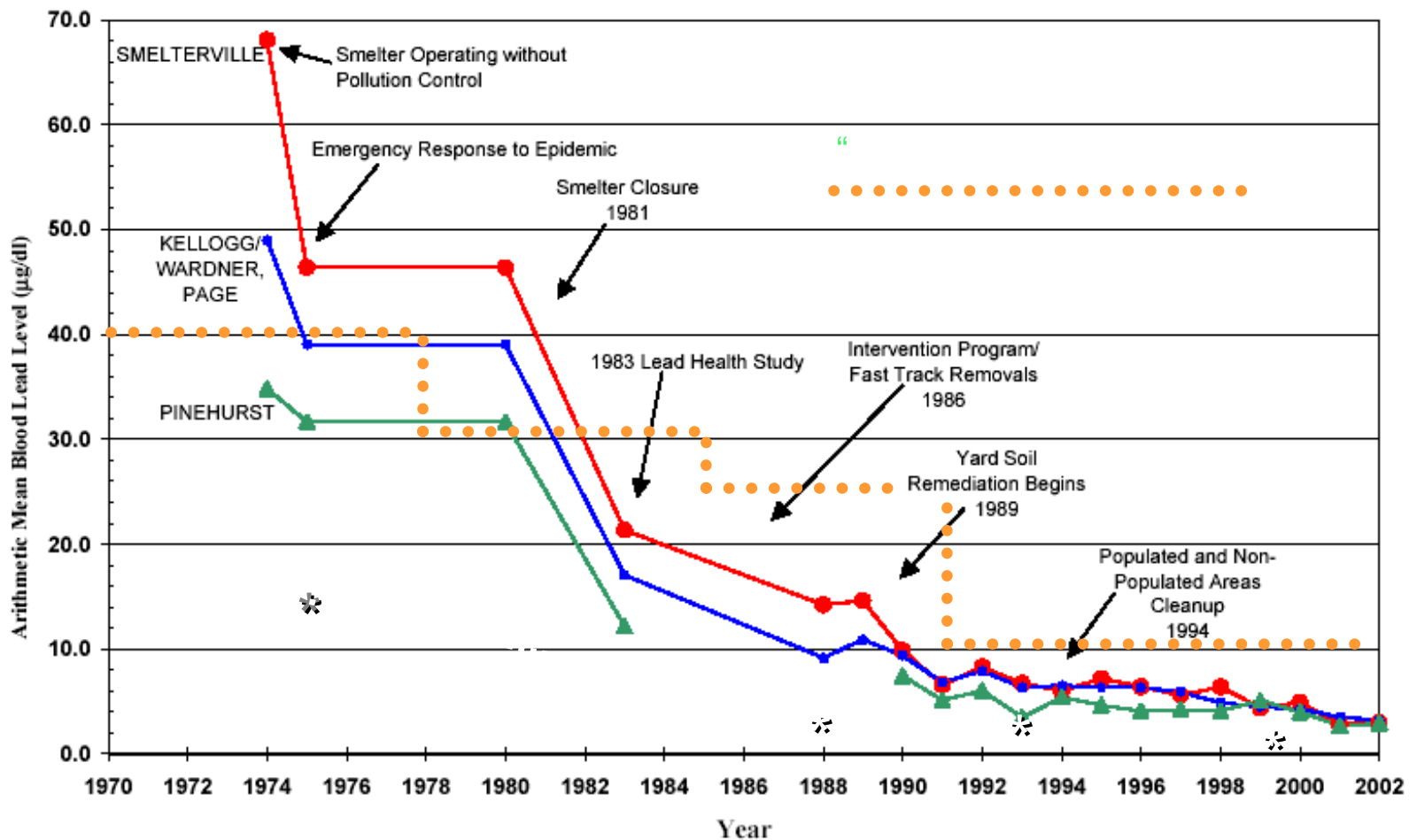
# The “Health” Issues

- Human Health
  - Lead, Lead and Lead
- Ecological Health
  - Lead
  - Zinc
- Different Regulatory Teams
- Different Political Agendas
- Different Budgetary Implications



# Bunker Hill

## Mean Blood Lead Levels: 1974-2002



# Ecological Health

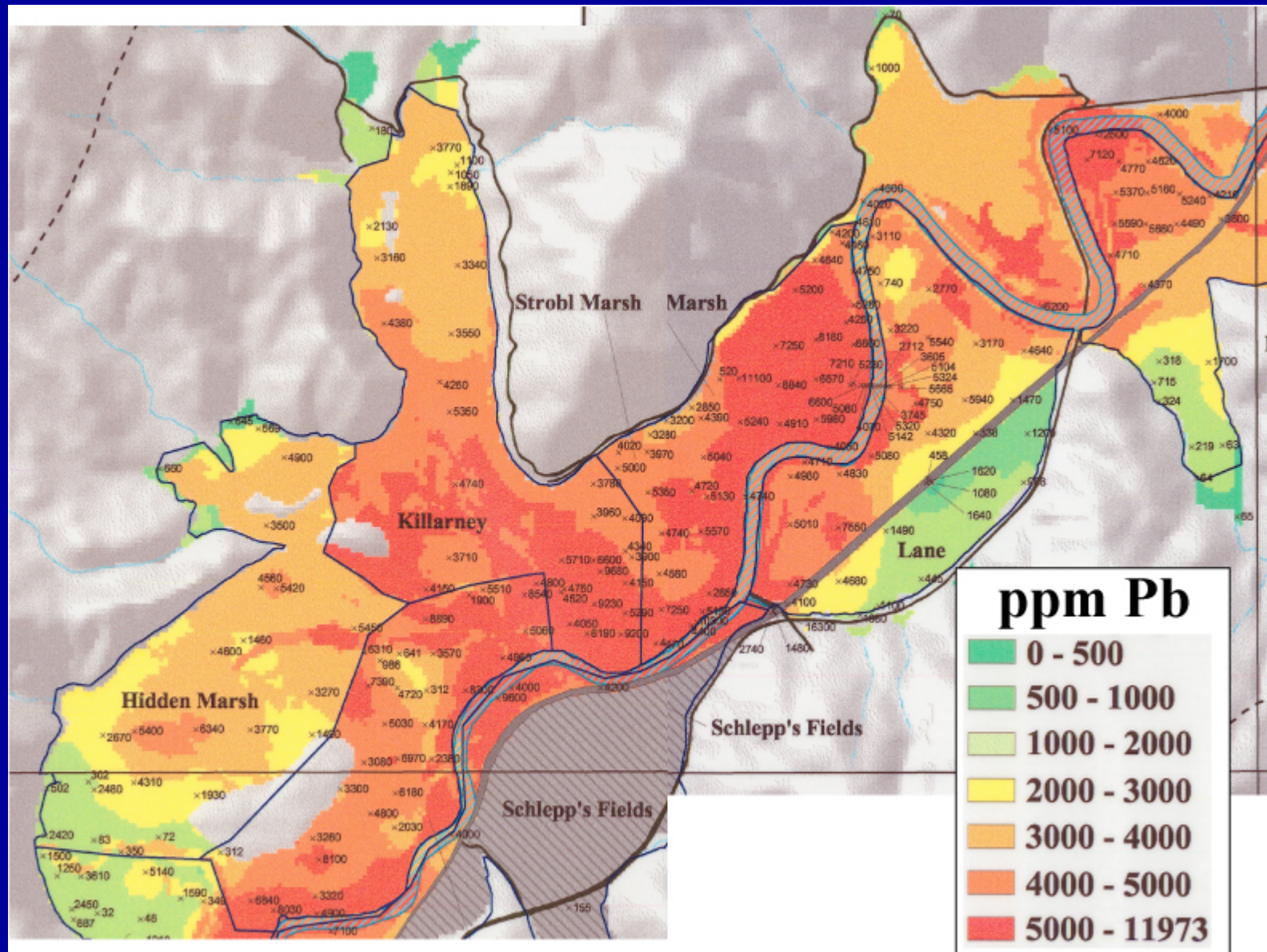
- Fish and Other Aquatic Life
  - Zinc
- Waterfowl (Tundra Swans, Geese, Ducks)
  - Lead







# Floodplain blanketed by sediment enriched in lead (Pb) (background Pb concentrations about 25 ppm)













# Coeur d'Alene River's Inflow Plume into Lake





# Selected Remedy... In brief

## **Human Health Protection: Final Remedy**

- Residential yard remediation, provide a barrier above 700 mg/kg lead; remove and replace upper foot of soil when greater than 1000 mg/kg lead.
- Removals at public use areas, an institutional controls program, and a lead health intervention program.
- Cost estimate: approximately \$92 million.

# Selected Remedy... In brief

Environmental Protection: “Interim Remedy”,  
20-30 years of prioritized actions...

- ***OU2 & 3:*** Inconsistent with “Systems Approach”
- ***Canyon and Ninemile Creeks:*** Combination of removals and passive water treatment
- ***South Fork Coeur d’Alene River:*** Removals and bank stabilization
- ***Main Stem Coeur d’Alene River:*** River bank removals, riverbed dredging (one area), and “splay removals”.

# Selected Remedy... In brief

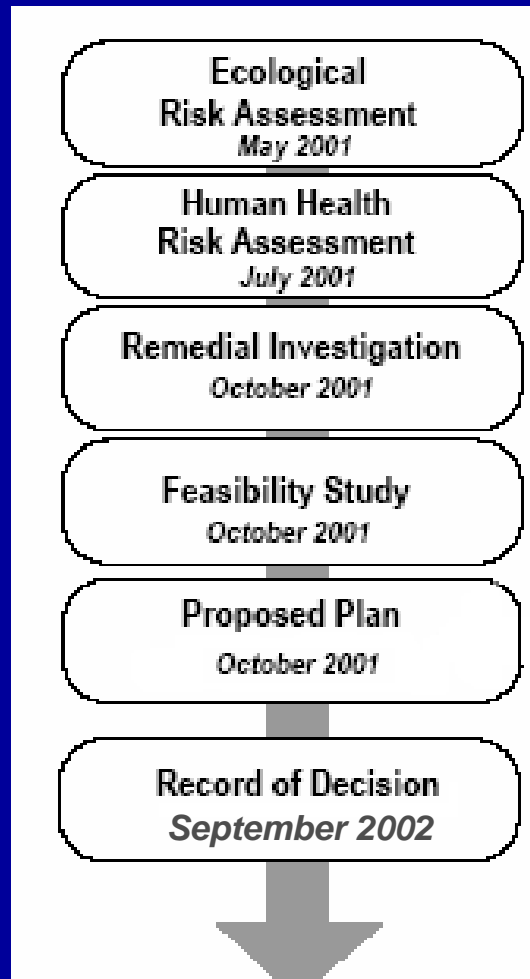
## Environmental Protection:

- ***Lower Basin floodplain:*** Remediate:
  - 1,200 acres of wetland area
  - 1,900 acres of lake bottom (less than 6ft deep)
- ***Coeur d'Alene Lake:*** Not included in the selected remedy
- ***Spokane River:*** Remediation of shoreline and sediment sites.
- ***Approximate Cost:*** \$270 million



# NRC Report

## Superfund Process



## Statement of Task

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# Site Characterization/Remedial Investigation

- Historical and collected data provide a useful depiction of metals concentrations in the surface waters, sediments, and soils over the wide spatial area.
- Groundwater – the primary source of dissolved zinc to surface water – was not adequately addressed.
- The RI did not adequately address the substantial hydrologic variations that occur in the basin.

# Human Health Risk Assessment

- Lead intake by current and future populations of children was estimated with a reasonable degree of certainty.
- Universal blood lead screening of children aged 1-4 is indicated for the Coeur d'Alene River Basin given the high prevalence of environmental lead.



# Ecologic Risk Assessment

- Found the assessment to be generally consistent with best scientific practices.
- Only a limited assessment of impacts to some organisms and communities
  - Coeur d'Alene River
  - Coeur d'Alene Lake
- Extensive evaluation with nominal impact.

# Remedial Decisions for Human Health Protection

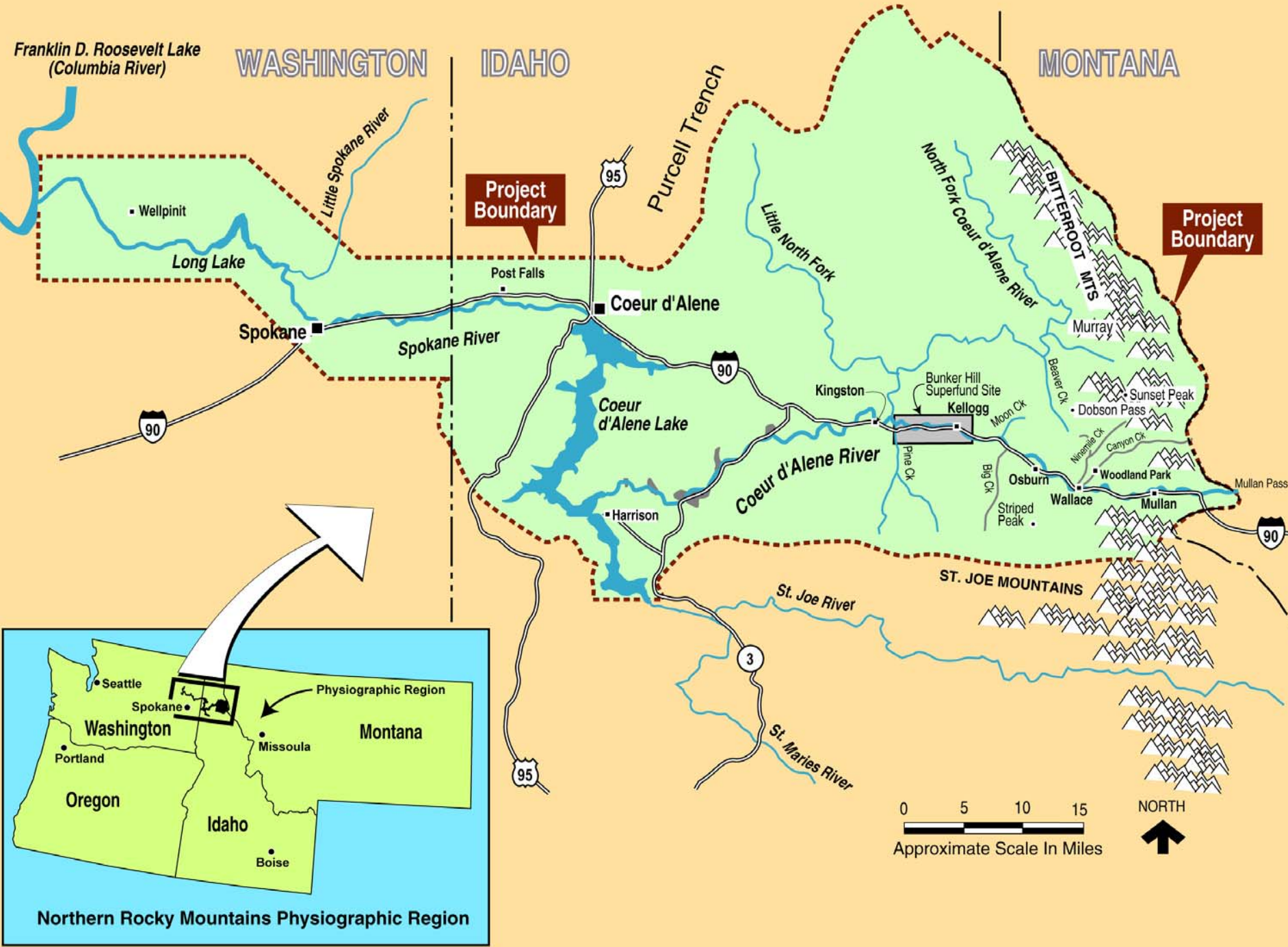
- The scientific evidence supporting substantial benefits of yard remediation for decreasing blood levels is currently weak.
- However, there are logical reasons to believe that yard remediations decrease exposure to lead and there is suggestive evidence of efficacy within the Bunker Hill Box and Basin.
- Barring recontamination, the proposed remedies are likely to reduce human health risks.
  - Long-term support will be needed to maintain the integrity of the remedies.

# Remedial Decisions for Environmental Protection

- Feasibility and effectiveness of actions intended to protect fish and wildlife have not been adequately characterized.
  - Repositories
  - Floodplain removals to stem zinc input
  - Recontamination:
    - Wetland remediations
    - Riverbank removals
- Recommendations largely recommend defining:
  - specific source areas contributing dissolved zinc
  - largest potentially mobile sources of lead
- Emphasize potential for recontamination in RD



# The Valley



# The Stakeholders













THE  
BUNKER HILL  
MINE

SINCE 1891  
TONS OF  
RECOVERED  
39%

METALS  
RECOVERED



# The Issues

- Cost & Economic Impact to the Region
- Feasibility
- Recontamination
- Further Damage to Environment
- Safety to Humans (Traffic Accidents)
- What About the Lake?
- Oversight and Funding Over Centuries???

# Mining Megsites

- Necessary to establish long-term management, funding, and administrative structures; Where final remedies cannot be implemented, establish a rigorous adaptive management process.
- The committee does not recommend amending CERCLA, but there has to be flexibility.